WHAT IS CLAIMED IS

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     1. An image reading device comprising:

     a photoelectric device provided with an empty transfer part;

     an A-D converter performing A-D conversion on

10   an output signal for each pixel of said photoelectric device;

     a reference voltage varying part varying a reference voltage of said A-D converter;

     a detecting part detecting a black correction

15   reference data from output for each pixel of said photoelectric device;

     a black shading correcting part subtracting the black correction reference data from digital image data obtained from the output signal for each pixel of

20   said photoelectric device when an image is read, through said A-D converter having the reference voltage set therein; and

     a correcting part correcting the black correction reference data by a ratio between an output

25   level of said empty transfer part obtained through said

A-D converter when the black correction reference data is detected and an output level of said empty transfer part obtained through said A-D converter when the image is read.

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2.   An image reading device comprising:

10   a photoelectric device;

an empty transfer part output generating part falsely generating an output of empty transfer part of said photoelectric device by outputting a predetermined voltage in predetermined timing;

15   an A-D converter performing A-D conversion on an output signal for each pixel of said photoelectric device;

a reference voltage varying part varying a reference voltage of said A-D converter;

20   a detecting part detecting a black correction reference data from output for each pixel of said photoelectric device;

a black shading correcting part subtracting the black correction reference data from digital image

25   data obtained from the output signal for each pixel of

said photoelectric device when an image is read, through

said A-D converter having the reference voltage set

therein; and

5   a correcting part correcting the black

correction reference data by a ratio of an output level

of said empty transfer part output generating part

obtained through said A-D converter when the black

correction reference data is detected and an output

level of said empty transfer part output generating part

10   obtained through said A-D converter when the image is

read.

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3.   The image reading device as claimed in

claim 1, wherein said photoelectric device comprises a

unity magnification contact-type sensor which receives

reflected light from an original through a unity

20   magnification optical system.

25   4.   The image reading device as claimed in

claim 2, wherein said photoelectric device comprises a unity magnification contact-type sensor which receives reflected light from an original through a unity magnification optical system.

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5.   The image reading device as claimed in

10   claim 1, wherein said correcting part comprises:

a first adding circuit calculating a sum of output levels of said empty transfer part for predetermined pixels obtained when the black correction reference data is detected;

15   a second adding circuit calculating a sum of output levels of said empty transfer part for the predetermined pixels obtained when the image is read;

a multiplying circuit multiplying the sum output from said second adding circuit with the black

20   correction reference data;

a dividing circuit dividing the result of multiplication output from said multiplying circuit by the sum output from said first adding circuit, and outputting the result of the division as the black

25   correction reference data after the correction.

6.   The image reading device as claimed in claim 2, wherein said correcting part comprises:

a first adding circuit calculating a sum of false output levels of empty transfer part from said

5   empty transfer part output generating part for predetermined pixels obtained when the black correction reference data is detected;

a second adding circuit calculating a sum of false output levels of empty transfer part from said

10   empty transfer part output generating part for the predetermined pixels obtained when the image is read;

a multiplying circuit multiplying the sum output from said second adding circuit with the black correction reference data;

15   a dividing circuit dividing the result of multiplication output from said multiplying circuit by the sum output from said first adding circuit, and outputting the result of the division as the black correction reference data after the correction.

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7.   The image reading device as claimed in

25   claim 1, wherein said correcting part comprises:

a first adding circuit calculating a sum of output levels of said empty transfer part for predetermined pixels obtained when the black correction reference data is detected;

5   a second adding circuit calculating a sum of output levels of said empty transfer part for the predetermined pixels obtained when the image is read;

a microcomputer multiplying the sum output from said second adding circuit with the black

10   correction reference data; and

dividing the result of the multiplication by the sum output from said first adding circuit, and outputting the result of the division as the black correction reference data after the correction.

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8.   The image reading device as claimed in

20   claim 2, wherein said correcting part comprises:

a first adding circuit calculating a sum of false output levels of empty transfer part from said empty transfer part output generating part for predetermined pixels obtained when the black correction

25   reference data is detected;

a second adding circuit calculating a sum of false output levels of empty transfer part from said empty transfer part output generating part for the predetermined pixels obtained when the image is read;

5   a microcomputer multiplying the sum output from said second adding circuit with the black correction reference data; and

dividing the result of the multiplication by the sum output from said first adding circuit, and

10   outputting the result of the division as the black correction reference data after the correction.

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9.   An image forming apparatus comprising:

the image reading device claimed in claim 1; and

an image forming device forming an image on a

20   sheet based on the image data read by said image reading device.

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10. An image forming apparatus comprising:

the image reading device claimed in claim 2; and

an image forming device forming an image on a sheet based on the image data read by said image reading device.

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11. An image reading device comprising:

photoelectric means provided with empty transfer part;

A-D converting means for performing A-D conversion on an output signal for each pixel of said photoelectric means;

reference voltage varying means for varying a reference voltage of said A-D converting means;

detecting means for detecting a black correction reference data from output for each pixel of said photoelectric means;

black shading correcting means for subtracting the black correction reference data from digital image data obtained from the output signal for each pixel of said photoelectric means when an image is read, through

said A-D converting means having the reference voltage set therein; and

correcting means for correcting the black correction reference data by a ratio of an output level

5   of said empty transfer part obtained through said A-D converting means when the black correction reference data is detected and an output level of said empty transfer part obtained through said A-D converting means when the image is read.

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12. An image reading device comprising:

15   photoelectric means;

empty transfer part output generating mean for falsely generating an output of empty transfer part of said photoelectric means by outputting a predetermined voltage in predetermined timing;

20   A-D converting means for performing A-D conversion on an output signal for each pixel of said photoelectric means;

reference voltage varying means for varying a reference voltage of said A-D converting means;

25   detecting means for detecting a black

correction reference data from output for each pixel of said photoelectric means;

black shading correcting means for subtracting the black correction reference data from digital image
5 data obtained from the output signal for each pixel of said photoelectric means when an image is read, through said A-D converting means having the reference voltage set therein; and

correcting means correcting the black
10 correction reference data by a ratio of an output level of said empty transfer part output generating means obtained through said A-D converting means when the black correction reference data is detected and an output level of said empty transfer part output
15 generating means obtained through said A-D converting means when the image is read.

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13. The image reading device as claimed in claim 11, wherein said photoelectric means comprises a unity magnification contact-type sensor which receives reflected light from an original through a unity
25 magnification optical system.

14.   The image reading device as claimed in claim 12, wherein said photoelectric means comprises a unity magnification contact-type sensor which receives reflected light from an original through a unity

5   magnification optical system.

10   15.   The image reading device as claimed in claim 11, wherein said correcting means comprises:

first adding means for calculating a sum of output levels of said empty transfer part for predetermined pixels obtained when the black correction

15   reference data is detected;

second adding means for calculating a sum of output levels of said empty transfer part for the predetermined pixels obtained when the image is read;

multiplying means for multiplying the sum

20   output from said second adding means with the black correction reference data;

dividing means for dividing the result of multiplication output from said multiplying means by the sum output from said first adding means, and outputting

25   the result of the division as the black correction

reference data after the correction.

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      16.   The image reading device as claimed in claim 12, wherein said correcting means comprises:

      first adding means for calculating a sum of false output levels of empty transfer part from said

10 empty transfer part output generating means for predetermined pixels obtained when the black correction reference data is detected;

      second adding means for calculating a sum of false output levels of empty transfer part from said

15 empty transfer part output generating means for the predetermined pixels obtained when the image is read;

      multiplying means for multiplying the sum output from said second adding means with the black correction reference data;

20   dividing means for dividing the result of multiplication output from said multiplying means by the sum output from said first adding means, and outputting the result of the division as the black correction reference data after the correction.

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17. The image reading device as claimed in claim 11, wherein said correcting means comprises:

first adding means for calculating a sum of output levels of said empty transfer part for
5 predetermined pixels obtained when the black correction reference data is detected;

second adding means for calculating a sum of output levels of said empty transfer part for the predetermined pixels obtained when the image is read;
10 a microcomputer multiplying the sum output from said second adding means with the black correction reference data; and

dividing the result of the multiplication by the sum output from said first adding means, and
15 outputting the result of the division as the black correction reference data after the correction.

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18. The image reading device as claimed in claim 12, wherein said correcting means comprises:

first adding means for calculating a sum of false output levels of empty transfer part from said
25 empty transfer part output generating means for

predetermined pixels obtained when the black correction
reference data is detected;

second adding means for calculating a sum of
false output levels of empty transfer part from said

5   empty transfer part output generating means for the
predetermined pixels obtained when the image is read;

a microcomputer multiplying the sum output
from said second adding means with the black correction
reference data; and

10   dividing the result of the multiplication by
the sum output from said first adding means, and
outputting the result of the division as the black
correction reference data after the correction.

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19.   An image forming apparatus comprising:
the image reading device claimed in claim 11;

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image forming means for forming an image on a
sheet based on the image data read by said image reading
device.

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20.   An image forming apparatus comprising:

the image reading device claimed in claim 12; and

image forming means for forming an image on a

5   sheet based on the image data read by said image reading

device.